

Claims

1. A frame for an electrolyser module comprising:
  - (a) a body;
  - (b) at least one electrolyser chamber opening defined in said body;
  - 5 (c) at least one degassing chamber opening defined in said body; and
  - (d) at least one separated gas opening defined in said body to facilitate removal of gas separated from the gas and liquid mixture disposed in said at least one degassing chamber.
2. A frame for an electrolysis module, said frame comprising:
  - 10 (a) a unitary body having a rounded peripheral shape;
  - (b) at least one electrolysis chamber opening defined in said body; and
  - (c) at least one degassing chamber opening defined in said body, said degassing chamber opening having a rounded shape.
3. A frame for an electrolysis module, said frame comprising:
  - 15 (a) a unitary body;
  - (b) at least one electrolysis chamber opening defined in said body, said electrolysis chamber opening having a rounded shape; and
  - (c) at least one degassing chamber opening defined in said body, said degassing chamber opening having a rounded shape.
- 20 4. A frame as claimed in any one of claims 1 - 3 wherein said degassing chamber opening is lung-shaped.
5. A frame as claimed in any one of claims 1 - 3 wherein said degassing chamber opening is circular.
6. A frame as claimed in any one of claims 1 - 3 wherein said degassing chamber  
25 opening is elliptical.

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7. A frame as claimed in any one of claims 1 - 6 wherein said electrolysis chamber opening is circular.
8. A frame as claimed in any one of claims 2 - 7 wherein said body has a rounded peripheral shape.
- 5 9. A frame as claimed in any one of claims 1 - 8 wherein said body has a circular peripheral shape.
10. A frame as claimed in any one of claims 1 - 9 wherein said body has a first side that is generally flat and an opposing second side that is generally flat.
11. A frame as claimed in any one of claims 10 wherein said first side defines a  
10 first connecting surface and said second side defines a second connecting surface.
12. A frame as claimed in claim 11 wherein said first connecting surface and said second connecting surface have corresponding connecting structures to facilitate the first connecting surface of one said frame connecting with the second connecting surface of a corresponding one of said frames.
- 15 13. A frame as claimed in claim 12 wherein said connecting structures comprise corresponding elevations and depressions defined in said first and second connecting surfaces.
14. A frame as claimed in claim 13 wherein said elevations and depressions have corresponding block shapes.
- 20 15. A frame as claimed in claim 13 wherein said elevations and depressions have corresponding triangular shapes.
16. A frame as claimed in any of claims 11 - 15 wherein said first and second connecting surfaces are adapted to receive a sealing gasket between adjacent connected frames.
- 25 17. A frame as claimed in any one of claims 1 - 16 further comprising at least one electrolyte conduit opening defined in said body.

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18. A frame as claimed in any one of claims 1 - 17 further comprising at least one separated gas conduit opening defined in said body.
19. A frame as claimed in claim 18 further comprising a separated gas connecting channel defined in said body for connecting said at least one degassing chamber opening to said at least one separated gas conduit opening.
20. A frame as claimed in anyone of claims 1 - 19 further comprising an electrolysis connecting channel defined in said body for connecting said at least one electrolysis chamber opening to said at least one degassing chamber opening.
21. A frame as claimed in any one of claims 1 - 20 wherein at least a portion of said at least one degassing chamber opening is positioned above said at last one electrolysis chamber opening.
22. A frame as claimed in any one of claims 1 - 21 wherein the surface area of said at least one degassing chamber opening is equal to or greater than the surface area of said at least one electrolysis chamber opening.
23. An electrolyser module comprising a plurality of frames as claimed in any one of claims 1 - 22, wherein said frames are connected together to define at least one electrolysis chamber and at least one degassing chamber, said degassing chamber having a rounded shape.
24. An electrolyser module comprising a plurality of unitary frames connected together to form at least one electrolyser chamber and at least one degassing chamber, said degassing chamber having a rounded shape.
25. An electrolyser module as claimed in claim 24 wherein each of said frames comprises:
- (a) a body;
  - (b) at least one electrolyser chamber opening defined in said body; and
  - (c) at least one degassing chamber opening defined in said body.

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26. An electrolyser module as claimed in claim 24 wherein each of said frames comprises:

- (a) a body having a rounded peripheral shape;
- (b) at least one electrolysis chamber opening defined in said body; and
- 5 (c) at least one degassing chamber opening defined in said body, said degassing chamber opening having a rounded shape.

27. An electrolyser module as claimed in claim 24 wherein each of said frames comprises:

- (a) a unitary body;
- 10 (b) at least one electrolysis chamber opening defined in said body, said electrolysis chamber opening having a rounded shape; and
- (c) at least one degassing chamber opening defined in said body, said degassing chamber opening having a rounded shape.

15 28. An electrolyser comprising an electrolysis module as claimed in any one of claims 24 - 27 further comprising a sealing gasket disposed between connected surfaces of said frames.

29. An electrolyser comprising an electrolysis module as claimed in any one of claims 24 - 28 in combination with an water supply system and a separated gas storage system.

20 30. An electrolyser as claimed in claim 29 wherein said water supply system is fluidly connected to at least one of said degassing chambers.

31. An electrolyser as claimed in claim 30 wherein said electrolyte from said electrolyte supply system is pressurized with separated gas from said degassing chamber.

25 32. A holding frame for an electrolyser module, said frame having an opening that forms an electrolysis chamber, characterized in that the frames have one or more

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additional openings that form one or more degassing chambers, wherein the gas that is generated is collected and allowed to separate into a liquid and gas phase.

33. A holding frame according to claim 32 additionally having one or more openings that form conduits for the supply of electrolyte and water.

5 34. A holding frame according to claim 32 having two additional openings that form conduits for the removal of the gasses that are separated off in the internal degassing chambers.

35. A holding frame according to claim 32 wherein the openings that form the degassing chambers are positioned above the opening that forms the electrolysis chamber and wherein the surface of the openings that form the degassing chambers is  
10 equal or larger than the surface of the opening that forms the electrolysis chamber.

36. An electrolyser module comprising a series of stacked electrolysis chambers and each chamber being held within two holding frames, wherein the frames are as claimed in claims 32 - 35.

15 37. An electrolyser comprising an electrolyser module as claimed in claim 36.

38. A ring-shaped holding frame according to claims 32 - 35 for a high pressure electrolyser module, said frame having one or more openings that form conduits for the supply of electrolyte said frames having openings that form conduits for the supply of electrolyte and water, wherein (1) the connecting surface of the ring-shaped frame  
20 has one or more elevations and/or one or more depressions in such manner that an elevation of a ring fits in a depression of a neighboring ring; (2) a gasket is placed in between said elevation in a particular ring and said depression of a neighboring ring; (3) the distance between the rim of said conduit and the outer wall of the opening forming the gas or electrolyte conduit, and the outer wall of the ring- shaped frame is  
25 such that the material can endure a pressure gradient of at least 200 bar and characterized in that the frames have one or more additional openings that form one or more degassing chambers, wherein the gas that is generated is collected and allowed to separate into a liquid and gas phase.

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39. A high pressure electrolyser module comprising a series of stacked electrolysis chambers and each chamber being held within two ring-shaped holding frames, wherein the frames are as claimed in claim 38.

40. An electrolyser which functions under high pressure comprising an electrolyser module as claimed in claim 39.

41. A high pressure electrolyser as claimed in claim 40 provided with a supply system to replace the water that is consumed during the course of the electrolysis with minimal moving parts using the pressure of the gas that is liberated in the high pressure electrolyser module as driving force.